



(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
22.01.1997 Bulletin 1997/04

(51) Int. Cl.<sup>6</sup>: **B29C 65/36**

(21) Application number: **94114032.9**

(22) Date of filing: **07.09.1994**

(54) **An apparatus for sealing thermoplastic-coated packaging material**

Eine Vorrichtung für das Abdichten von thermoplastoberflächenbelegtes Verpackungsmaterial

Un dispositif pour l'étanchage de matière d'emballage revêtu de thermoplastique

(84) Designated Contracting States:  
AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT  
SE

(30) Priority: **08.09.1993 SE 9302894**

(43) Date of publication of application:  
15.03.1995 Bulletin 1995/11

(73) Proprietor: **Tetra Laval Holdings & Finance SA**  
1009 Pully (CH)

(72) Inventor: **Blomqvist, Peter**  
S-224 75 Lund (SE)

(74) Representative: **Müller, Hans-Jürgen, Dipl.-Ing. et al**  
Patentanwälte Dipl.-Ing. Hans-Jürgen Müller,  
Dipl.-Chem.Dr. Gerhard Schupfner,  
Dipl.-Ing. Hans-Peter Gauger,  
Postfach 101161  
80085 München (DE)

(56) References cited:  
US-A- 4 704 509  
US-A- 5 048 269

US-A- 4 891 929

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

### TECHNICAL FIELD

The present invention relates to an apparatus for sealing a thermoplastic-coated material, with at least one layer of a metal foil, preferably aluminium, the apparatus comprising an inductor which is connectible to a high frequency current source and displays substantially parallel, slightly spaced apart conductors, a core of magnetic material and an electrically insulating carrier portion.

### BACKGROUND ART

It has long been known in the packaging industry to employ packaging materials comprising outer layers of thermoplastic, these outer layers being capable of being sealed together by fusion after heating and compression for realizing tight and durable sealing joints or seams. For example, such a material may be fed in web form through a filling machine and formed into a tube which is longitudinally sealed by means of a lap joint. This material tube is filled with its contemplated contents, whereafter the tube is transversely sealed and severed to form individual packages which, in a later stage, are finally formed, for example into parallelepipedic packages or cartons.

A packaging material including a metal foil, preferably aluminium foil, is ideally employed when the transverse seals are made by so-called induction sealing. An apparatus for such induction sealing is disclosed and described in Swedish Patent Specification SE 451 973. In this instance, an induction current is induced in the aluminium layer of the packaging material, this current heating the thermoplastic layer disposed adjacent the aluminium layer so that the thermoplastic layer can be sealed to a corresponding thermoplastic layer.

The above-described method of transversely sealing packaging blanks as described in the above-disclosed patent specification has, however, proved to be unsuitable for highly viscous products and products containing particles such as kernels, fruit seeds or fibres. According to the above-described method, two substantially parallel transverse seals are made between which the packaging tube is severed to form individual packaging blanks. In this instance, sealing flaps or fins are created which lie outside the transverse seals and where product residues may accumulate. These product residues can, on storage of the package, take on a highly disagreeable and unhealthy appearance.

### OBJECT OF THE INVENTION

One object of the present invention is to realize an apparatus for induction sealing which is suitable for use together with products which are highly viscous or which contain particles such as kernels, fruit seeds or

fibres and in which the transverse seal of the package is made such that no sealing flaps or fins are created where product residues may gather.

### SOLUTION

This and other objects have been attained according to the present invention in that the apparatus of the type described by way of introduction has been given the characterizing feature that the conductors are three in number, these being disposed such that the current density in the conductors is approximately equal.

Preferred embodiments of the present invention have further been given the characterizing features as set forth in the appended subclaims.

### BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWING

One preferred embodiment of the present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawing, in which:

Fig. 1 is a cross section through an inductor; and Fig. 2 shows how the packaging material is sealed using an inductor according to the present invention.

The Drawing shows only those details essential to an understanding of the present invention, the arrangement of the inductor in a filling machine (which is well-known to a person skilled in the art) having been omitted.

### DESCRIPTION OF PREFERRED EMBODIMENT

An inductor 1 according to the invention is shown in Fig. 1. The inductor 1 displays three substantially parallel conductors 2, 3 which are disposed in an electrically insulating carrier layer 4 which, in its interior, houses a core 5 of a ferrite material. The core 5 of ferrite material is insulated from the three conductors 2, 3. Both of the outer conductors 2 display a gently rounded cross section or alternatively a square or rectangular cross section. Both of the outer conductors 2 accommodate cooling ducts 6 in their interior, these being intended for coolant. The central conductor 3 is of substantially U-shaped appearance. Each conductor displays, on its upper surface 7, a bead or ridge 14 which projects above the surrounding surface 7 a distance of approx. 0.3 mm.

The three conductors 2 and 3 are preferably connected in parallel to a high frequency alternating current source (not shown). In such instance, a considerably higher current force will be obtained in the central conductor 3, but because of the configuration of the central conductor 3 (with the upwardly open U), an inductor 1 will be obtained all three of whose conductors 2, 3 dis-

playing approximately the same current density on the upper surface 7.

An inductor 1 according to the present invention may also be connected in series or inductively by means of a capacitor.

The inductor 1 is reinforced by a steel body 8 and the entire inductor 1 is disposed in a sealing jaw 9 to which may be imparted the desired sealing movement and which may exert the desired sealing pressure. The sealing jaw 9 is operative to move towards a likewise movable counter jaw 10. The packaging material 11 which is intended to be transversely sealed is advanced between the sealing jaw 9 and the counter jaw 10. The packaging material 11 is disposed between the two jaws 9 and 10 such that two thermoplastic layers 12 which are intended to be fused or sealed together are oriented towards one another.

When the two sealing jaws 9 and 10 move towards one another and there entrap between them the packaging material 11 which is to be transversely sealed, a seal will be created in three substantially parallel sealing lines wherein the centremost is of largest extent. When the two sealing jaws 9 and 10 are urged towards one another, the ridges 14 disposed on the conductors will locally exert a slightly greater compressive force and will contribute in creating a more reliable and tighter sealing of the packaging material 11. The packaging material 11 is intended to be severed in the centremost sealing joint or seam, in that a knife 13 disposed in the movable counter jaw 10 moves down through the material 11 into the U-shaped groove of the central conductor 3.

After transverse sealing employing an inductor 1 according to the present invention, any possible product residues will be enclosed between the transverse seal of the outer conductors 2 and the transverse seal of the central conductor 3. In such instance any possible product residues will be enclosed in a material which is just as aseptic as the remainder of the package and will not constitute any obstacle to the filling of products containing, for example, fibres, fruit seeds or kernels into the containers. The package severed in the central sealing joint or seam will not display any sealing fin where product residues may gather.

As has been apparent from the foregoing description, the present invention realizes an apparatus for transverse sealing of packaging blanks in which no sealing fin or flap is created on severing of the packaging blanks to form individual packages. In this instance, a transverse seal will here be obtained which is well suited in the filling of contents of high viscosity or contents which contain particles such as fruit seeds, kernels or fibres.

The present invention should not be considered as restricted to that described above and shown on the Drawing, many modifications being conceivable without departing from the scope of the appended Claims.

## Claims

1. An apparatus for sealing a thermoplastic-coated packaging material (11), with at least one layer of a metal foil, preferably aluminium, the apparatus comprising an inductor (1) which is connectible to a high frequency current source and displays substantially parallel, slightly spaced apart conductors (2, 3), a core (5) of magnetic material and an electrically insulating carrier portion (4), characterized in that the conductors (2, 3) are three in number and are disposed such that the current density in the conductors (2, 3) is approximately equal.
2. The apparatus as claimed in Claim 1, characterized in that the centremost (3) of the three conductors (2, 3) is provided with a substantially U-shaped groove.
3. The apparatus as claimed in Claim 1, characterized in that the conductors (2, 3) are connected in parallel.
4. The apparatus as claimed in Claim 1, characterized in that the conductors (2, 3) are connected in series.
5. The apparatus as claimed in Claim 1, characterized in that the conductors (2, 3) are inductively connected to one another.
6. The apparatus as claimed in Claim 5, characterized in that the conductors (2, 3) are inductively connected by means of a capacitor.
7. The apparatus as claimed in Claim 1, characterized in that the inductor (1) is disposed in a sealing jaw (9) which is intended to be capable of being pressed against a counter jaw (10), while the material (11) intended for sealing is accommodated between the jaws (9, 10).
8. The apparatus as claimed in Claim 1, characterized in that the conductors (2, 3) display longitudinally slightly projecting ridges (14) along which the compression force against the portion of the packaging material (11) intended for sealing is locally increased.
9. The apparatus as claimed in Claim 8, characterized in that the height of the ridges (14) is approx. 0.3 mm.

## Patentansprüche

1. Vorrichtung zum Versiegeln eines thermoplastbeschichteten Materials (11) mit wenigstens einer Schicht aus einer Metallfolie, bevorzugt Aluminium, wobei die Vorrichtung einen Induktor (1) aufweist,

der mit einer Hochfrequenzstromquelle verbunden werden kann und im wesentlichen parallele, etwas voneinander beabstandete Leiter (2, 3), einen Kern (5) aus Magnetmaterial sowie einen elektrisch isolierenden Trägerabschnitt (4) aufweist, **dadurch gekennzeichnet, daß** die Zahl der Leiter (2, 3) drei beträgt, die derart angeordnet sind, daß die Stromdichte in den Leitern (2, 3) etwa gleich ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** der mittlere (3) der drei Leiter (2, 3) mit einer im wesentlichen U-förmigen Nut versehen ist. 10
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Leiter (2, 3) parallelgeschaltet sind. 15
4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Leiter (2, 3) in Reihe geschaltet sind. 20
5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Leiter (2, 3) induktiv verbunden sind. 25
6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, daß** die Leiter (2, 3) mittels eines Kondensators induktiv geschaltet sind. 30
7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** der Induktor (1) in einer Versiegelungsbacke (9) angeordnet ist, die dazu bestimmt ist, daß sie gegen eine Gegenbacke (10) gepreßt wird, während das zum Versiegeln bestimmte Material zwischen den Backen (9, 10) aufgenommen wird. 35
8. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die Leiter (2, 3) in Längsrichtung leicht vorstehende Rippen (14) aufweisen, längs derer die Druckkraft gegen den zum Versiegeln bestimmten Abschnitt des Verpackungsmaterials (11) lokal verstärkt wird. 40
9. Vorrichtung nach Anspruch 8, **dadurch gekennzeichnet, daß** die Rippen (14) eine Höhe von etwa 0,3 mm aufweisen. 45

#### Revendications

1. Appareil de scellement d'une matière d'emballage (11) revêtue de matière thermoplastique et comportant au moins une couche d'une pellicule métallique, de préférence en aluminium, l'appareil comprenant un inducteur (1) qui est agencé de façon à pouvoir être connecté à une source de courant à fréquence élevée et qui présente des conducteurs (2, 3) légèrement espacés et 50

sensiblement parallèles, un noyau (5) en matière magnétique et une partie de support (4) électriquement isolante, caractérisé en ce que les conducteurs (2, 3) sont au nombre de trois et sont disposés de façon que la densité de courant dans les conducteurs (2, 3) soit approximativement égale.

2. Appareil tel que revendiqué à la revendication 1, caractérisé en ce que celui (3) des trois conducteurs (2, 3) qui est central comporte une rainure sensiblement en U.
3. Appareil tel que revendiqué à la revendication 1, caractérisé en ce que les conducteurs (2, 3) sont connectés en parallèle.
4. Appareil tels que revendiqué à la revendication 1, caractérisé en ce que les conducteurs (2, 3) sont connectés en série.
5. Appareil tel que revendiqué à la revendication 1, caractérisé en ce que les conducteurs (2, 3) sont connectés entre eux d'une manière inductive.
6. Appareil tel que revendiqué à la revendication 5, caractérisé en ce que les conducteurs (2, 3) sont connectés d'une manière inductive au moyen d'un condensateur.
7. Appareil tel que revendiqué à la revendication 1, caractérisé en ce que l'inducteur (1) est disposé dans une mâchoire de scellement (9) qui est destinée à pouvoir être appliquée sous pression sur une mâchoire complémentaire (10), tandis que la matière (11) destinée au scellement est placée entre les mâchoires (9, 10).
8. Appareil tel que revendiqué à la revendication 1, caractérisé en ce que les conducteurs (2, 3) comportent des nervures (14) qui font légèrement saillie dans le sens de la longueur et le long desquelles la force de compression appliquée sur la partie de la matière d'emballage (11) destinée au scellement est augmentée localement.
9. Appareil tel que revendiqué à la revendication 8, caractérisé en ce que la hauteur des nervures (14) est approximativement de 0,3 mm.

Fig.1

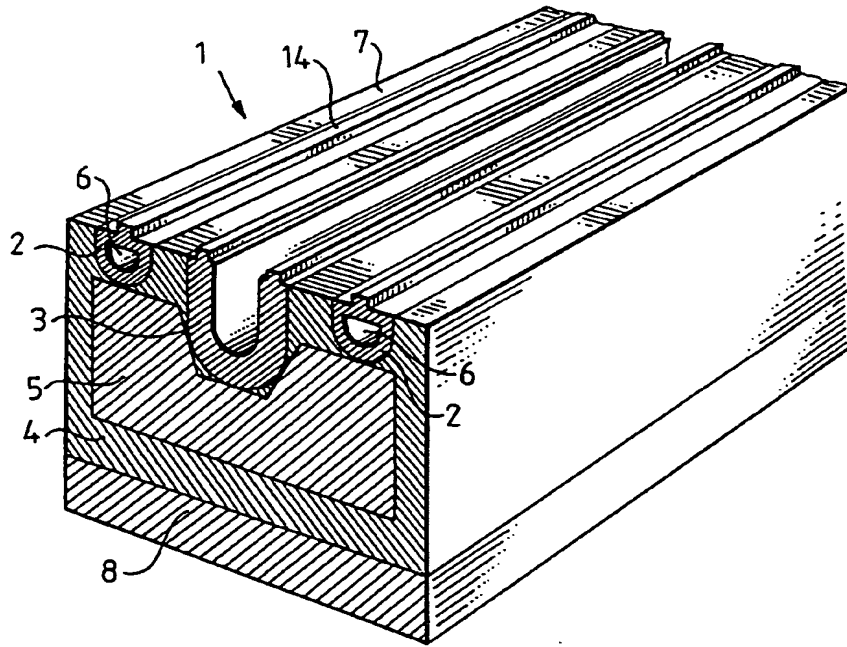
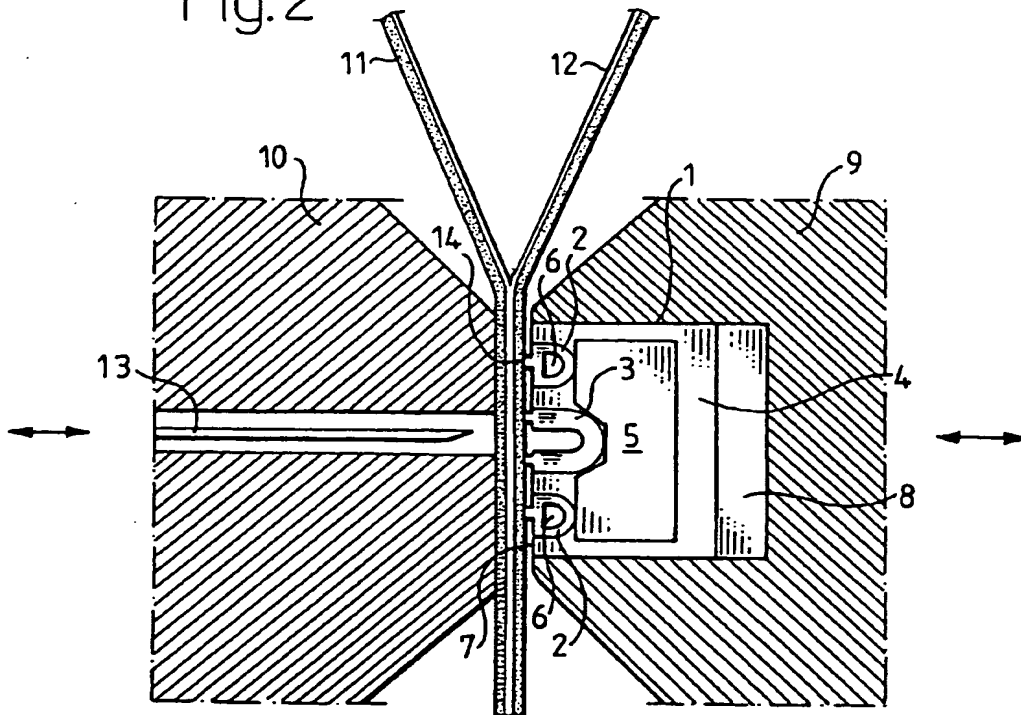


Fig.2



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**